AIRS Project
AIRS Ground Data Processing System

AIRS Science Processing Software Update

AIRS Science Team Meeting

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September 18-20, 2002

Topics

- AIRS Data Processing at JPL
- AIRS Software Release Plan
- Data Processing – Roles and Responsibilities
- Level 1B Decimated Product
- AIRS Data Pool Resource Concept

AIRS Data Processing at JPL

JPL's Team Leader Science Computing Facility (TLSCF) -- a very busy place

- The TLSCF provides resources for:
  - Localized processing of AIRS Instruments data (AMSU-A, HSB, AIRS)
  - Science software algorithm development, upgrade and test
  - Validation campaigns – correlative data repository
  - Calibration analysis and trending
- The TLSCF provides the environment for processing:
  - Expedited Data – for calibration teams
  - Routine (standard) data – for algorithm development and validation

AIRS Data Processing at JPL (cont'd.)

Two major data processing thrusts:

- Expedited data – essential to the IR calibration team
  - Ingested frequently at high priority – during calibration campaigns
  - Immediately processed upon receipt using "Direct Broadcast" code
  - Delivered to the AIRS IR calibration team

- TLSCF Data System (TDS) – full operability using latest PGEs
  - Daily Processing
  - Focus Day Processing
  - Special processing for calibration, validation and science teams

TLSCF Data System (TDS)

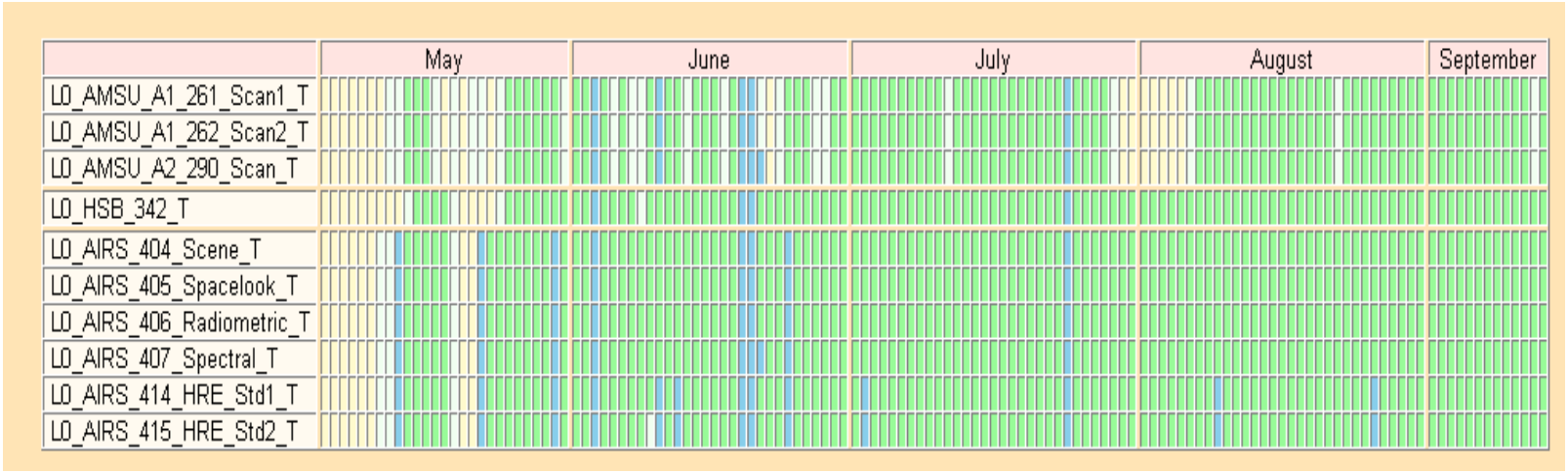
Concept

- TDS supports an aggressive data calibration and validation schedule
  - Process/Reprocess all AIRS / AMSU / HSB data from L0 through L1B
  - Periodic “Focus Day” processing
    - Process L0 through L2
    - Plan include processing one day of data every three months

Use

- TDS minimizes the impact of latency in SPS PGE changes when compared to scheduled SPS updates to the DAAC
  - Latency
    - TDS has access to the latest baseline and prototype SPS PGEs
    - SPS deliveries to the DAAC are scheduled, documented in ICD
  - TDS maximizes flexibility to react to unexpected events

AIRS Data Processing at JPL
Level 0 Data Coverage Since Launch



0.0 < average_2hour_size/nominal_size <= 0.5
0.5 < average_2hour_size/nominal_size <= 0.85
0.85 < average_2hour_size/nominal_size <= 0.99
0.99 < average_2hour_size/nominal_size <= 1.01
1.01 < average_2hour_size/nominal_size <= 1.25
1.25 <= average_2hour_size/nominal_size
nominal file size is not available
partial level 0 data set in that date
missing all data files in that date

Detailed narrative descriptions of "On-Orbit Events" can be viewed at:

•http//airsteam.jpl.nasa.gov/password_protected/AIRSstatus.html

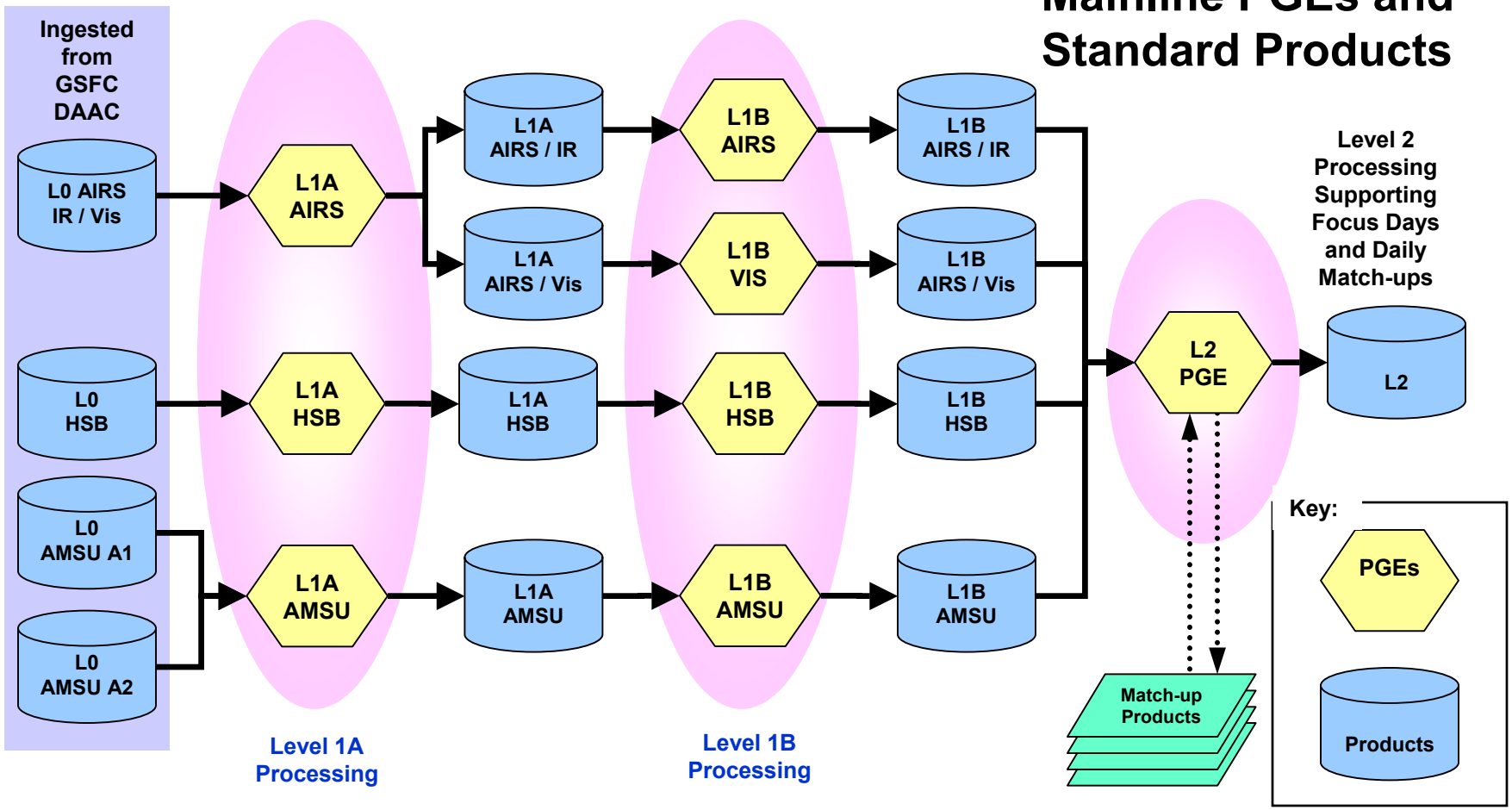
TLSCF Data System (TDS) (cont'd.)

Extended Activities

- TDS supports calibration and validation through Launch+12 months
- At Launch+12 months, TDS activities will shift emphasis to:
  - Archival of validation data
  - Limited processing of Level 0 data for software verification purposes
  - Science Team and NRA Team support for new research products
  - Software development (e.g., Level 3 PGE)
  - Supporting routine radiance bias estimation and tuning updates
  - Continued support to instrument teams and GSFC DAAC operations
    - Instrument health and safety
    - Calibration trending
    - Updated PGEs

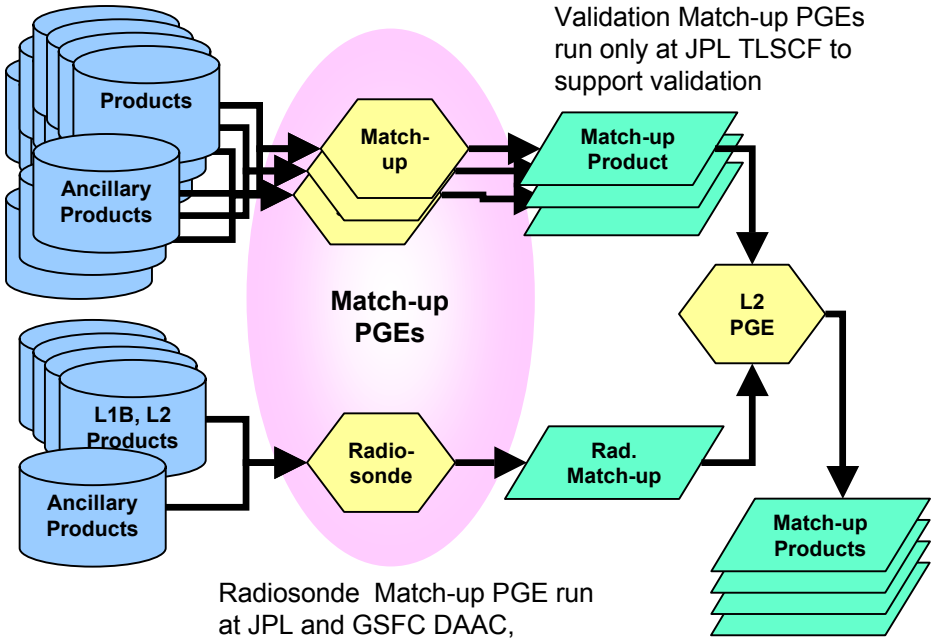
AIRS Data Processing at JPL
Science Processing

Mainline PGEs and Standard Products



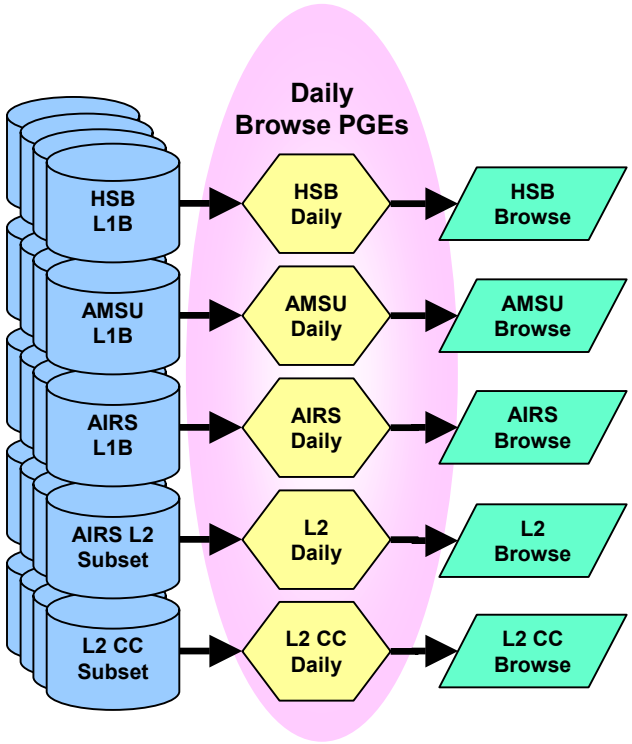
AIRS Data Processing at JPL
Science Processing (cont'd)

Browse and Match-up PGEs



Radiosonde Match-up PGE run at JPL and GSFC DAAC, supporting routine radiance bias estimation and tuning updates

Level 2 processing of Match-up products run at JPL TLSCF to support Level 2 PGE development



All Daily Browse PGEs to be run at GSFC DAAC

Only L1B Daily Browse PGEs typically run at TLSCF, Level 2 Browse products only created for focus days

A Day in the Life of the TDS

Data Processing at the TDS

- A typical Processing Day: GB / Day
  - Level 0 Products (from GSFC DAAC) 14
  - Level 1A 18
  - Level 1B 36
  - Daily Products (Validation Match-ups, Browse) 9
  - Support Products 5
- Focus day data archived with each new software baseline
  - Add Level 2 Products 12 GB / Day

Focus Days:

July 4, 2002
July 20, 2002
September 6, 2002

- All data archived
  - On-line Cache
    - 2 TB currently available now – provides 1 week's data
    - 7 TB planned – will significantly expand rapid access archive
  - Tape archive – 27 TB providing up to one year's data

AIRS Software Release Plan

Three software releases are planned for first year after launch

- V2.5 – emphasizing Level 1A PGEs
  - Delivered to GSFC in early August 2002
- V2.7 – emphasizing Level 1B, Browse, Match-up PGEs
  - Planned for delivery to GSFC in January 2003
  - Public release of L1B data at launch + 9 months
- V3.0 – emphasizing Level 2 PGE
  - Planned for delivery to GSFC in April 2003
  - Public release of L2 data at launch + 12 months

AIRS Software Release Plan
Version 2.7

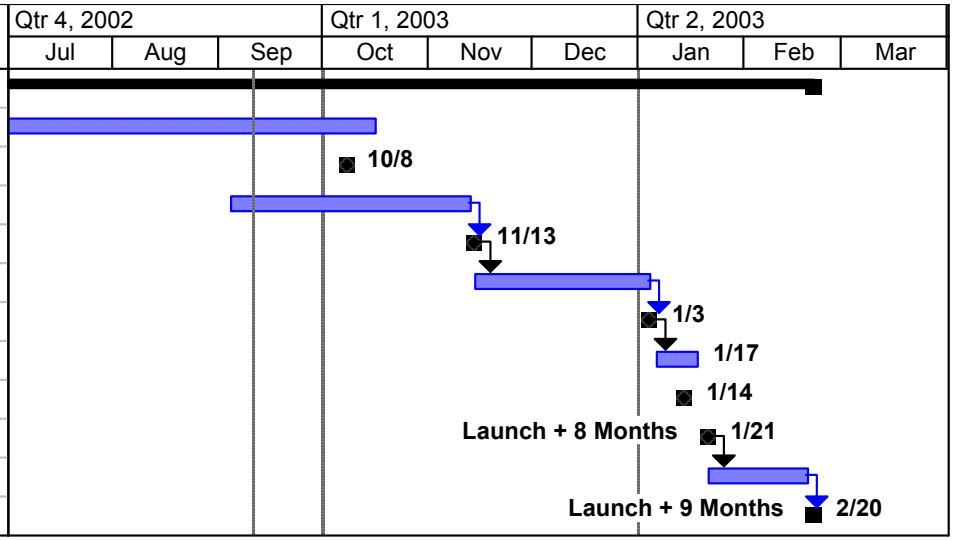
V2.7 – our next release to the GSFC DAAC

- Emphasis: L1B Products
  - First public release of AIRS, AMSU and HSB data
  - Fully-functioning PGEs: L1A, L1B, Browse (L1B Only), Match-up
- Current Status
  - Level 1A PGEs very stable
  - Level 1B PGEs approaching stability
  - Match-up PGE approaching stability – performance enhancements
  - Browse PGE ready
- Updates to L1A and L1B PGEs are likely in subsequent releases
  - Geolocation refinements
  - Radiance refinements

AIRS Software Release Plan
Version 2.7 (cont'd.)

- V2.7 Dates to Remember
  - Final planned inputs to CCB — October 8, 2002
  - Development period ends — November 13, 2002
  - Anomaly correction period ends — January 3, 2003
  - Delivery to DAAC — January 21, 2003
  - V2.7 operational – first public data release — February 20, 2003

ID	Task Name
1	**V2.7 - Level 1B Product Emphasis**
2	Science/Data Evaluation
3	Final Inputs to CCB
4	Development and Unit Test
5	Initial build and delivery to TDS
6	End-to-end checkout, Anomaly Quickfix
7	Operational in TDS
8	Sustained Testing
9	Preship Review
10	Delivery to DAAC (L+8M)
11	JPL Support to DAAC, DAAC I&T
12	Public Data Release L1B



AIRS Software Release Plan
Version 3.0

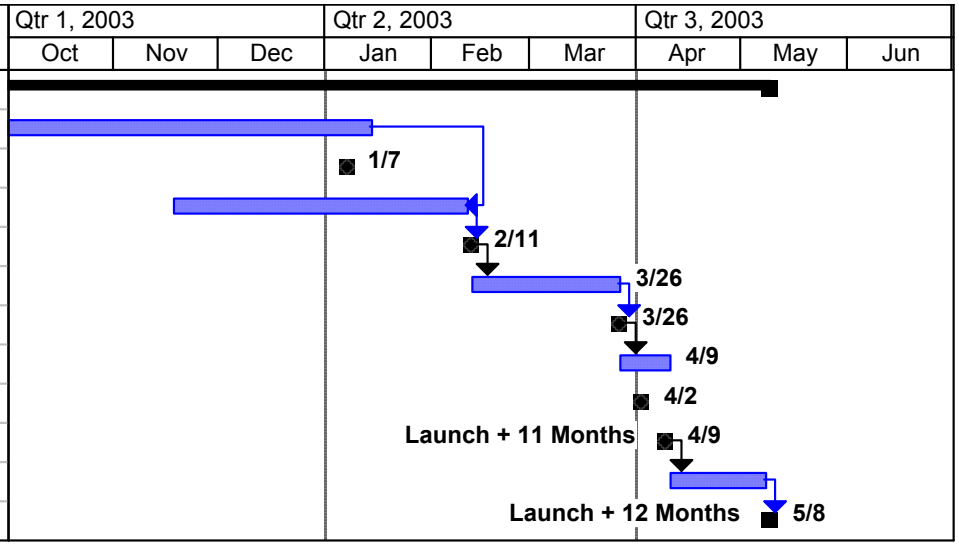
V3.0 – final planned release during first year after launch

- Emphasis: L2
  - First public release L2 products
  - Level 3 products made available as well (more details later)
  - All AIRS PGEs should be fully functional
- Current Status
  - Level 2 PGE still under development
  - Browse PGEs are ready to process Level 2 data
  - Updates to L1A and L1B PGEs are likely in this release
    - May result in reprocessing all L1A, L1B at the DAAC
- Updates to the Level 2 PGE is likely in subsequent releases

AIRS Software Release Plan
Version 3.0 (cont'd.)

- V3.0 Dates to Remember
  - Final planned inputs to CCB — January 7, 2003
  - Development period ends — February 11, 2003
  - Anomaly correction period ends — March 26, 2003
  - Delivery to DAAC — April 9, 2003
  - V3.0 operational – first Level 2 data release — May 8, 2003

ID	Task Name
1	**V3.0 - Level 2 Product Emphasis**
2	Science/Data Evaluation
3	Final inputs to CCB
4	Development and Unit Test
5	Initial build and delivery to TDS
6	End-to-end checkout, Anomaly Quckfix
7	Operational in TDS
8	Sustained Testing
9	Preship Review
10	Delivery to DAAC (L+11M)
11	JPL Support to DAAC
12	Public Data Release L2



Later Releases

Beyond V3.0

- Routine software releases scheduled for delivery to GSFC DAAC on 6 month intervals
  - Anomaly fixes
  - Algorithmic enhancements
  - New features and capabilities
- Table upgrades may occur more frequently on an ad-hoc basis
  - After planned deicing cycles
  - After unexpected Aqua or AIRS Instrument events
- New PGEs
  - Level 3
  - Other user-friendly data products

Data Processing
Roles and Responsibilities

At Launch, JPL TDS is primary data processing facility

- JPL is primary data processing facility – supporting Science Team
  - Algorithm development and revisions, overall PGE clean-up
  - Validation support
- GSFC DAAC is primarily a support facility
  - Provides Level 0 data and other support products to JPL
  - Flow testing of PGEs through Level 1A

By V2.5 (August 2002)

- GSFC DAAC taking on more PGEs
  - DAAC continues to provide Level 0 data and other support products
  - Flow testing of PGEs through Level 1B

Roles and responsibilities in transition

- GSFC will continue to take on more production responsibility with later releases

Data Processing – Roles and Responsibilities
Launch – V2.5 Timeframe

V2.2.3.73 (launch version) – first light
JPL begins routine production, GSFC DAAC ramps up

PGE	JPL	GSFC DAAC	Data Release
Level 1A	Full Production	Limited to flow tests	JPL, subscription
Level 1B	Limited to flow tests	Not Processed	N.A.
Level 2	Focus Days	Not Processed	N.A.
Match-up	Limited to flow tests	Not Processed	N.A.

V2.5 – JPL TDS is primary data processing facility

PGE	JPL	GSFC DAAC	Data Release
Level 1A	Full Production	Full Production	JPL, subscription
Level 1B	Full Production	Limited to flow tests	Hidden Client
Level 2	Focus Days	Not Processed	N.A.
Match-up	Full Production	Limited to flow tests	Hidden Client

Data Processing – Roles and Responsibilities
V2.7 and V3.0 Timeframe

V2.7 – begins data production shift from JPL to GSFC DAAC

PGE	JPL	GSFC DAAC	Data Release
Level 1A	Limited	Full Production	N.A.
Level 1B	Limited	Full Production	Public Release
Level 2	Focus Days	Limited to flow tests	Hidden Client
Match-up	Full Production	Radiosonde only	Hidden Client

V3.0 – data production fully shifted to GSFC DAAC

PGE	JPL	GSFC DAAC	Data Release
Level 1A	Limited	Full Production	N.A.
Level 1B	Limited	Full Production	Public Release
Level 2	Limited	Full Production	Public Release
Match-up	Validation Only	Radiosonde only	Hidden Client

L1B Decimated Product

- A “kinder-gentler” user-friendly AIRS Product for global studies
  - Sampled Level 1B “golf ball” data from AIRS, AMSU-A, HSB
  - Approximately 90% smaller than combined Level 1B data products
  - Reduced sampling closer to poles
  - Separate daily, ascending and descending products
- File and Processing Characteristics:
  - Inputs: 241 Level 1B AIRS, AMSU and HSB products
  - Outputs: 2 files per day (ascending/descending), 2 GB each
  - PGEs: 1 – *Match-up type* processing
- Delivery Goal – V2.7 (with Level 1B PGEs) or interim, before V3.0
  - Currently being prototyped at JPL
  - Processed daily at GSFC DAAC as part of standard processing
  - Data archived at GSFC DAAC Data Pool
  - Interface specs, production rules and ESDT definition still to be developed

AIRS Data Pool Resource Concept

- JPL andDAAC will discuss expanded Data Pool availability of AIRS data

		Per year	5 Years
• 1B Decimated	4 GB/day	1,460 GB	7,250 GB
• Level 3 – *Retrieval*			
• Daily:	30 MB/day	11 GB	55 GB
• Pentad:	30 MB/pentad	2 GB	11 GB
• Monthly:	30 MB/month	<0.5 GB	2 GB
• Level 3 – *Retrieval Quantization*			
• 3-Day:	70 MB/ea (3-days)	9 GB	45 GB
• Monthly:	30 MB/month	<0.5 GB	1.8 GB
• Level 3 – *Radiance Quantization*			
• 3-Day:	151 MB/ea (3-days)	20 GB	93 GB
• Monthly:	30 MB/month	<0.8 GB	4 GB
• **TOTAL**		**1.5 TB**	**7.5 TB**